

We Claim

1. A system for exhausting gas via a nozzle, comprising:
a nozzle comprising a nozzle body portion defining a
5 nozzle exit, characterised in that the nozzle body portion
comprises fluid injection means, positioned upstream of the
exit relative to a fluid flow created by the operation of
the system, for injecting fluid upstream of the exit.
2. A system as claimed in claim 1 wherein the nozzle body
10 portion further defines a nozzle flow channel leading to
the nozzle exit, wherein the fluid injection means is
positioned for injecting fluid within the nozzle flow
channel.
3. A system as claimed in claim 1 wherein the nozzle has
15 an exterior surface and the fluid injection means is
positioned for injecting fluid at the exterior surface of
the nozzle upstream of the exit.
4. A system as claimed in claim 1 wherein the fluid
injection means comprises one or more apertures in the
20 outer surface or surfaces of a nozzle body for providing
one or more fluid jets.
5. A system as claimed in claim 4 wherein the aperture(s)
are positioned upstream of the exit.
6. A system as claimed in claim 4 further comprising
25 means for providing the fluid jet(s) via the aperture(s)
during operation of the system.
7. A system as claimed in claim 4 further comprising
pulsing means for pulsing the fluid jet(s).
8. A system as claimed in claim 7 wherein the pulsing
30 means pulses the fluid jet(s) at a frequency of Hz and/or
kHz.
9. A system as claimed in claim 7, wherein the pulsing
means are controllable to vary the frequency at which one
or more fluid jets are pulsed.
- 35 10. A system as claimed in claim 4, further comprising
means for altering the mass flow of the fluid jet(s).

11. A system as claimed in claim 4 wherein the mass flow rate of the fluid jet(s), when operational, is fixed.
12. A system as claimed in claim 4, wherein the apertures have a fixed position and further comprising means for
5 varying the position of fluid jets by providing fluid jets via selected apertures only.
13. A system as claimed in claim 1 wherein the fluid injection means creates microjets of fluid.
14. A system as claimed in claim 1 for use as an aeroplane
10 engine, wherein the nozzle body tapers to an edge at an exit.
15. A system as claimed in claim 1, for use as an aeroplane engine, further comprising means for controlling the injection means to inject fluid during take-off of the
15 aeroplane but not to inject fluid when cruising.
16. A method of suppressing part of the noise of a gas exhausted from a nozzle comprising a nozzle body portion defining a nozzle exit, the method comprising the step of:
injecting fluid into a fluid flow created by the
20 operation of the engine while the fluid flow is travelling adjacent the nozzle body portion.
17. A system for exhausting gas via a nozzle, comprising:
a nozzle comprising a nozzle body portion defining a nozzle exit, characterised in that the nozzle body portion
25 comprises output means, positioned upstream of the exit relative to a fluid flow created by the operation of the system, for disturbing a boundary layer between the nozzle body portion and the fluid flow.
18. A system as claimed in claim 17, wherein the output
30 means comprises fluid injection means for injecting fluid upstream of the exit or sound wave production means.
19. A system as claimed in claim 18, wherein the fluid injection means comprises a plurality of apertures for providing fluid microjets.
- 35 20. A system as claimed in claim 19, further comprising pulse means for pulsing the fluid microjets.

21. A method of suppressing part of the noise of a gas exhausted from a nozzle comprising a nozzle body portion defining a nozzle exit, the method comprising the step of:

disturbing a boundary layer between the nozzle body
5 portion and a fluid flow created by the operation of the system.

22. A system for exhausting gas via a nozzle, comprising:

a nozzle, the nozzle comprising a nozzle body portion
comprising fluid injection means for injecting fluid
10 characterised in that the system further comprises control
means for controlling the fluid injection means to inject
fluid during a first phase of operation and to not inject
fluid during a second phase of operation.

23. A system as claimed in claim 22 wherein the first
15 phase is at least a part of the take-off phase of an
aeroplane flight.

24. A system as claimed in claim 22 wherein the second
phase is at least a part of the cruising phase of an
aeroplane plane flight.

20 25. Any novel subject matter or combination including
novel subject matter disclosed, whether or not within the
scope of or relating to the same invention as any of the
preceding claims.